REMARKS

Claims 1-33 have been cancelled.
Claim 34, now allowed, is retained.
Claims 35-40 have been added.

Claims have been amended, with the exception of claim 34 which is now allowed. The Examiner rejected claims under 35 U.S.C. 103(a) as being unpatentable over MacAulay et al.'660 in view of Longacre'758. The rejection is respectfully traversed. Applicant has amended claims to better claim the invention. New claims 35-40 are limited to what is described in the specification of the application. The format of this document has been checked by a licensed US Patent Attorney. Attempt has been made to clarify the language and simplify the presentation with the help of a native English speaker.

The present invention is about a new fluorescence diagnosis endoscope system. Fluorescence diagnosis endoscope systems prior to the present invention, including MacAulay et al.'660, have some common problems, i.e. dim and unclear images, high cost, and awkward operation. The present invention can turn a videoendoscopic system widely used in the world especially in Japan to an excellent fluorescence endoscope system able to provide bright and clear integrated image of fluorescence as well as background images at a minimal cost.

It is commonly recognized that videoendoscope system, which is now widely used, is superior to fiberendoscope system, which was used previously (Reference 3, page 679). A videoendoscope system allows clearer images and it is easier to operate. Using Light-Induced Fluorescence Endoscopy (LIFE, Xillix Technologies, Canada, based on MacAulay et al.'660) available on a commercial basis, the system used a combination of one fiberscope and two large high-sensitive color cameras attached to the fiberscope outside the patient's body (Reference 1, page 236, Fig. 1). In their system, a huge excitation blue light source is required separate from the white light source (Reference 1, page 236, Fig. 1). The image obtained is poor (Reference 1; page 235, and Figs. 4 and 7: Reference 2, Fig. 3), since LIFE only accounts for

the ratio of red to green autofluorescence and does not incorporate information from reflected light (Reference 3, page 679). Although, in their application, MacAulay et al. mentioned integrating the fluorescence image with the remittance light image, it becomes clear that this is impossible using their technique. Based on my invention, just by placing a barrier filter in front of a black and white CCD at the tip of a videoscope widely used nowadays, the fluorescence image sensed at the period of blue light illumination is integrated with images sensed by the period of green and red remittance lights. This results in bright and clear image, in which the emitted fluorescence can be easily distinguished from the background, without using either a special light source or a high-sensitive CCD both of which are expensive. MacAulay et al. also taught the use of a color CCD placed at the tip of an endoscope with a barrier in front, but up until now this method has not proven successful. Theoretically, by using a color CCD with a barrier filter in front, for example in case of observing the auto-fluorescence of human digestive tissue, the excitation blue light is completely cut off, and the emitted green auto-fluorescence can pass through the barrier filter and is sensed as its original color. Therefore, red light can only be used to obtain the remittance light image. Green light cannot be used as remittance light, since this makes it impossible to distinguish the emitted green auto-fluorescence from the background. On the other hand, using my invention, in which a black and white CCD with a barrier filter placed in front, in the period of blue light illumination, the excitation blue light is completely cut off by the barrier filter while the emitted green auto-fluorescence can pass through. The green auto-fluorescence is sensed by the black and white CCD just as electric signal, which can be transmitted to the blue or green or red channel of TV monitor. Supposing the green auto-fluorescence is transmitted to the blue channel, this auto-fluorescence image can be integrated with background images obtained by remittance green and red lights, which are transmitted to the green and red channels or to the red and green channels, respectively.

Longacre'758 taught the use of black and white CCD in a videoendoscope. In fact, videoendoscopes with a black and white CCD at the tip of the scope used in combination with a rotating disk upon which red, blue and green filters are mounted for obtaining white light image, have been widely used

around the world for almost 20 years. The point that the Examiner rejected my claims under 35 U.S.C. 103(a), would be whether it was easy or not, at the time when my invention was done, for experts in the field of endoscopy to create the same invention as mine based on the knowledge taught by MacAulay et al. together with the knowledge of using a black and white CCD in a videoendoscope. In 1998, I have already presented a study using my fluorescence electronic endoscope system in a Japanese national congress (Reference 4, page 562, foot note). From the following evidences, it becomes clear that, at the time when I made my invention (in 1998), the experts in the field of endoscopy could not expect that a videoendoscope with black and white CCD widely used throughout the world could be turned to an excellent fluorescence endoscope system just by placing a barrier filter in front of the black and white CCD.

After MacAulay et al. made their application and Xillix has made the LIFE system available commercially, in order to overcome the problems of LIFE system, i.e. dim and unclear image, high cost, and awkward operation, there have been a few applications on fluorescence endoscope invented, including US 5,891,016 B1, US 6,099,466 B1, US 6,280,378 B1, and US 6,471,636 B1. In these application, an idea of using a black and white CCD with a barrier filter in front to integrate the fluorescence image with remittance light images has never been suggested. The white light image and fluorescence image are separately demonstrated on different monitors, in order to solve the problem that it is usually difficult to perform the diagnosis accurately with only the dim fluorescence image. It is noteworthy that in the systems presented in US 6,099,466 B1 and 6,471,636 B1, a rotating red/green/blue band-pass filter in combination with a black and white CCD is used to provide white light image, while another CCD with a barrier filter is used to provide the fluorescence image.

In the year 2003, my Japanese Patent (JP 3309276 B) for this invention initially met with an objection (Objection: 2003-70284) but eventually this objection was overcome. During this process, the invention of MacAulay et al. (as appeared in JP 10-500588 A) together with JP 9-70384 A (corresponding US 6,099,466 B1), in which the technique to obtain white light image using a black and white CCD in combination with a rotating

RGB band-pass filter was addressed, were also cited. This means that the Japanese Patent Office has concluded that, experts in the field of endoscope with the knowledge taught by MacAulay et al. and the knowledge of using a black and white CCD in a videoendoscope to get white light image could not expect that a videoendoscope with black and white CCD used widely throughout the world could be turned to an excellent fluorescence videoendoscope just by placing a barrier filter in front of the CCD.

In the year 2005, there were three studies, published in Digestive Endoscopy (Reference 1), Lung Cancer (Reference 2) and GASTROINTESTINAL ENDOSCOPY (Reference 3), using a newly-developed fluorescence videoendoscope offered by OLYMPUS with the same principle (Reference 1, Fig. 3) as my invention (Reference 4 (published in the year 2002), Figs. 12-13). It is described that algorithm used to construct an auto-fluorescence image in this newly-developed autofluorescence endoscope is different from that of LIFE system based on MacAulay et al.'660 (References 3, page 680). This fact directly shows that experts in the field of endoscope themselves accept that my invention cannot be easily developed merely by having the knowledge taught by MacAulay et al. and the knowledge of using a black and white CCD in a videoendoscope to obtain white light image.

In view of the above, the new claims 35-40 in this application, together with claim 34 now allowed, are believed to be in immediate condition of allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

If, for any reason, the Examiner finds the application other than in condition for allowance, the Applicant requests that the Examiner contact Mr. Paul Sadler, a friend who is acting as the interpreter and translator for the Applicant, at his Canadian contact number 1 (905) 452-7856 from June 1 to August 31, 2006 or his Japanese contact number (011-81-29-851-8038) after September 1, 2006, or by e-mail at anytime at paulandjennifersadler@hotmail.com to discuss any steps necessary to place the application in condition for allowance.

REFERENCES

1. Nakaniwa N, Namishima A, Ogihara T, Ohkawa A, Abe S, Nagahara A, et al. Newly-developed autofluorescence imaging videoscope system for the detection of colonic neoplasms. Digestive Endoscopy 2005; 17: 235-240.
2. Chiyo M, Shibata K, Hoshino H, Yasufuku K, Sekine Y, Lizasa T, et al.. Effective detection of bronchial preinvasive lesions by a new autofluorescence imaging bronchovideoscope system. Lung Cancer 2005;48:307-313.
3. Kara MA, Peters FP, ten Kate FJW, van Deventer SJ, Fockens P, Bergman JJGHM. Endoscopic video autofluorescence imaging may improve the detection of early neoplasia in patients with Barrett's esophagus. GASTROINTESTINAL ENDOSCOPY 2005;61:679-685.
4. Bhunchet E, Hatakawa H, Sakai Y, Shibata T. Fluorescein electronic endoscopy: a novel method for detection of early stage gastric cancer not evident to routine endoscopy. GASTROINTESTINAL ENDOSCOPY 2002;55:562-571.

Japanese unexamined Patent Publications cited during the examination process of my Japanese Patent (JP 3309276 B) for this invention.

JP 3-97441 A
JP 10-295633 A
JP 2-299633 A
JP 3-97439 A
JP 4-92306 A
JP 9-327433 A
JP 9-154812 A
JP 8-140928 A

Japanese unexamined Patent Publications cited during the process of the objection (Objection: 2003-70284) against my Japanese Patent (JP 3309276 B) for this invention.

JP 3-97441 A
JP 9-70384 A (corresponding US 6,099,466 B1)
JP10-500588 A (the invention of MacAulay et al.)
JP 63-122421 A
JP 3-97442 A
JP 6-125911 A

If there are any fees required by this communication, please inform the applicant at the fax phone number –81-29-851-3721.

Respectfully submitted,

Date: August 28, 2006

By: Ekapot Bhunachet

Ekapot Bhunachet
2-32-22 Kasuga, Tsukuba
Ibaraki, 305-0821
Japan
81-29-851-3721
Applicant

CERTIFICATION OF MAILING

I hereby certify that this correspondence is being deposited with EMS mail in an envelope addressed to Eleni Mantis Mercader, Primary Examiner, Art Unit 3737, UNITED STATES PATENT AND TRADEMARK OFFICE, P.O. Box 1450, Alexandria, VA. 22313-1450, on August 28, 2006.

Name of applicant: Ekapot Bhunachet

Date of Sig.: August 28, 2006

Signature: Ekapot Bhunachet